REMARKS

In the Office Action, the Examiner rejected Claims 11-17 under 35 U.S.C. §103 as being unpatentable over the prior art. The Examiner also raised a minor objection to the language of Claim 11, and the Examiner noted informalities in Figures 1 and 3.

More specifically, Claims 11, 12, 16 and 17 were rejected as being unpatentable over U.S. Patent 6,712,927 (Grimbergen, et al.) in view of Japanese reference JP 10-336,154 (Shimizu, et al.); and Claims 11, 12, 16 and 17 were further rejected as being unpatentable over U.S. Patent 4,332,833 (Aspnes, et al.) in view of Shimizu, et al. Claims 13-15 were rejected as being unpatentable over Grimbergen, et al. in view of Shimizu, et al. and further in view of U.S. Patent 4,311,725 (Holland); and Claims 13-15 were also rejected as being unpatentable over Aspnes, et al. in view of Shimizu, et al. and further in view of Holland.

Claim 11 is being amended to better define the subject matter of the claim and to address the Examiner's objection to the language of the claim. Also, new Claims 18 and 19, which are dependent from Claim 11, are being added to describe preferred features of the invention.

With respect to the Examiner's objection to the language of Claim 11, line 2 of this claim is being amended, as the Examiner suggested, to change "method" to "system." In view of this, the Examiner is asked to reconsider and to withdraw the objection to Claim 11.

In addition, in response to the Examiner's objection to Figures 1 and 3, Applicants are submitting herewith new drawing sheets showing Figures 1 and 3. These new drawings correctly number the torch and control as 36 and 40 respectively, and the overall system shown in Figure 1 is being labeled "10." The Examiner is, thus, asked to reconsider and to withdraw the objection to the drawings.

With regard to the rejections of the claims over the prior art, Applicants believe it may be helpful to summarize briefly the present invention.

The present invention, generally, relates to a system for fabricating optical devices. In this system, a material is applied onto an optical substrate to form a film. In order to control the film growth, an optical signal is directed onto the film, so that the optical signal interacts with the film. The optical signal is either transmitted through or reflected from the film. The wavelength of the optical signal is dithered relative to a given wavelength, and a feedback circuit is provided to control the fabrication of the film, using the difference between a defined wavelength and the dithered wavelength of the optical signal after interacting with the film.

Both Grimbergen, et al. and Aspnes, et al. disclose plasma processing systems. However, as the Examiner has recognized, both of these references fail to disclose or teach several important features of the present invention, including the dither source and the feedback circuit. In order to overcome the deficiencies of Grimbergen, et al. and Aspnes, et al as references, the Examiner relies on Shimizu, et al.

Shimizu, et al. describe an apparatus for generating short optical pulses by adjusting the phase components of a laser beam using a feedback loop. The basic apparatus requires two optical intensity modulators (3a and 3b in their figure); the first imposes a clock signal (5) on the optical beam, while the second imposes a phase shifted version of the same clock. The resulting dual modulated optical signal is then sampled and sent to a photodetector; it is then mixed with a dither modulation signal derived from a separate source (11), which is unrelated to the phase shifted clock signal (5) used previously to drive the optical intensity modulators. After some signal processing, the resulting electrical signal is then used to

control the phase shift imposed on the clock which feeds the second optical intensity modulator (3b).

There are a number of important distinctions between the preferred embodiment of this invention and the feedback loop proposed by Shimizu et al:

- The preferred approach of the present invention requires only a single dither frequency source, while Shimizu et al. requires both a dither source and a separate clock source;
- The preferred embodiment of this invention modulates a laser with a single step via direct control of the laser bias current, while Shimizu et al. requires two separate optical intensity modulators external to the laser;
- This invention preferably implements a true vector cross product between the original dither signal and the signal derived from the laser beam after it interacts with a thin film substrate. Shimizu et al. mixes a separate dither signal with a dual modulated optical beam, which does not provide a vector cross product since there is no relationship between the two signals being mixed.

Claim 11 describes important differences between the claim and the prior art. In particular, Claim 11 describes the feature of a feedback circuit for generating a correlation signal representing the difference between the dithered given wavelength of the optical signal and the defined wavelength, and for using the correlation signal to adjust at least one of the manufacturing parameters to make the optical device with said given property at the defined wavelength.

As discussed above, neither Grimergen, et al. nor Aspnes, et al. discloses this type of feedback circuit, and Shimizu, et al. does not suggest or teach using a dithering wavelength in the manner described in Claim 11.

As noted by the Examiner, Grimbergen, et al. discloses a plasma vapor deposition system including computer controlled feedback in response to a detected signal, such signal possibly coming from a laser source illuminating the inside of the chamber. It fails to teach dithering of the laser source wavelength or use of such a signal for control of the plasma deposition process. As noted above, however, the dither feedback system of Shimizu, et al. is distinguished from the preferred wavelength locked loop of the present invention in several important ways. Thus the combination of Shimizu and Grimbergen does not yield the present invention.

Further, the preferred approach of the present invention dynamically adjusts the thickness of a thin film during deposition to match the center wavelength of a laser source. The thin film acts as an optical bandpass filter, whose bandpass is being adjusted during the deposition process. There is no mention of controlling the optical bandpass of a thin film in the individual or combined references of Shimizu and Grimbergen.

Claims 13-15 are rejected over Grimbergen in view of Shimizu as applied to claims 11, 12, 16, and 17, and further in view of Holland. As noted above, Grimbergen in view of Shimizu does not teach the combination of art represented in the present claims, since there are structural differences between those claims and Shimizu. Holland teaches a coating apparatus controlled by light reflected from or transmitted through a thin film; but does not teach the dither control technique. Thus, the combination of these three references still does not yield an apparatus with the same structure as the present invention.

Claims 11, 12, 16, and 17 are also rejected over Aspnes et al. in view of Shimizu. As noted by the Examiner, Aspnes teaches a chemical vapor deposition scheme with a control signal derived from a laser light source which monitors the process; it does not teach the dither source and control mechanism. Since the dither mechanism used with this invention is structurally different from Shimizu, the combination of Shimizu with Aspens still does not yield an apparatus with the same structure as the present invention.

Claims 13-15 are rejected over Aspnes in view of Shimizu, as applied to claims 11, 12, 16, and 17, and further in view of Holland. The contributions of Aspens, Holland, and Shimizu have been discussed previously. As noted, since the dither mechanism used in the present invention is structurally different from Shimizu, the combination of Shimizu with Aspens and Holland still does not yield an apparatus with the same structure as described in Claim 11.

In the Office Action, the Examiner made several references as of record, including Coronel et al, Kinsel, and Goodwin. None of these address wavelength locking feedback loops with dither modulation and thus do not contribute substantially to the other prior art references. In particular, Kinsel describes a technique applicable only to mode-locked lasers. Further, Goodwin describes a dither signal requiring both a first and second component at different frequencies used to compensate a thermal modulation component in a laser.

In light of the above-discussed differences between Claim 11 and the prior art, and because of the advantages associated with those differences, Claim 11 patentably distinguishes over the prior art and is allowable. Claims 12-19 are dependent from Claim 11

and are allowable therewith. The Examiner is, consequently, respectfully requested to reconsider and to withdraw the rejections of Claims 11-17 under 35 U.S.C. §103, and to allow these claims and new Claims 18 and 19.

For the reasons set forth above, the Examiner is asked to reconsider and to withdraw the objection to the drawings and the objection to the language of Claim 11. The Examiner is, in addition, requested to reconsider and to withdraw the objections of Claims 11-17 under 35 U.S.C. §103, and to allow Claims 11-19. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is asked to telephone the undersigned.

Respectfully submitted,

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